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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/333,783	06/15/1999	RALPH PRINGLE JR.	970376	4506

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CLEVELAND, OH 44114

EXAMINER

MEYER, DAVID C

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 03/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/333,783

Applicant(s)

PRINGLE, RALPH

Examiner

David C. Meyer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 December 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 7-10 is/are rejected.
- 7) ☒ Claim(s) 2-6 and 11-15 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 24, 2003 has been entered.

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Davies (US 6,163,381).

Regarding claims 1 and 10, Davies discloses a dual sensor atmospheric correction system. The system comprises a deformable mirror 34 that is illuminated with optical energy and that has a number of actuators (column 4, line 48) for moving portions of the deformable mirror. The system further comprises two wavefront sensors 20 and 22, the data from which combines in a merged complex reconstructor (MCR).

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The MCR includes a matrix of complex numbers, the real component corresponding to subaperture intensity and the imaginary component to slope (column 5, lines 25-35).

The MCR is used to control actuators in the deformable mirror. Inasmuch as the complex numbers contained in the MCR matrix contain a real component corresponding to subaperture intensity, each complex element in the matrix is, in effect, intensity-weighted.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davies (US 6,163,381). Davies does not disclose that deformable mirror 34 is controlled by 941 actuators. Absent any showing of criticality, the specific number of actuators employed would have been obvious to one of ordinary skill in the art at the time of invention in view of the desired performance and system cost.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davies in view of Rather (US 4,825,062). Davies does not disclose how many actuators correspond to a given subaperture. Rather teaches an adaptive optics system comprising a wavefront sensor having a plurality of subapertures which correspond one-to-one with segments 44 of a deformable mirror 40 (column 9, lines 37-40). Rather discloses that each mirror segment is controlled by a plurality of actuators 54,56,58

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(column 4, lines 57-64). The specific number of actuators associated with each subaperture would have been obvious to one of ordinary skill in the art at the time of invention in view of the desired performance and system cost.

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Davies in view of Wisner (US 4,271,355). Davies does not disclose a servo compensator for controlling the actuators. It is well known to use a servo control system in conjunction with an adaptive optics system as taught by Wisner. Wisner discloses an adaptive optics system comprising a servo control system 44 that receives an electrical signal from a radiation detector 36 and outputs correction signals 52 to actuators 20 disposed on the back surface of a deformable mirror 32. It would have been obvious to one of ordinary skill in the art at the time of invention to employ a servo compensator to control the actuators in order to achieve a reliable and accurate system control.

***Allowable Subject Matter***

8. Claims 2-6 and 11-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: Regarding claims 2-6 and 11-15, the prior art of record does not disclose calculating the average of the amplitudes detected in the wavefront sensor's subapertures or using an average amplitude to perform a weighting function.

***Response to Arguments***

9. Applicant's arguments, see Remarks, filed December 24, 2003, with respect to the rejection(s) of claim(s) 1 and 7-10 under 35 U.S.C. sections 102(b) and 103(a) have been fully considered and are persuasive. As the applicant points out on page 7 of the Remarks, Cochran (US 4,750,818) discloses only that the estimation matrix H may be changed based on current weather and atmospheric conditions, not based on amplitudes measured in respective subapertures of the wavefront sensor. Cochran states that recalculation of the estimation matrix H "should eventually" be possible on a millisecond basis to deal with the variation of the intensity of the light. However, Cochran does not state that the intensity at each subaperture is measured and used to produce weighted slopes (column 6, lines 7-12). Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Davies (US 6,163,381).

***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Cochran (US 4,724,404) discloses an amplitude-weighted adaptive laser device comprising separate waveform and amplitude sensors used to control actuators in a deformable mirror device.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to David C. Meyer whose telephone number is 571-272-2442. The examiner can normally be reached on M-F 8:30-5:30.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DCM  
March 4, 2004

  
**DAVID PORTA**  
**SUPERVISORY PATENT EXAMINER**  
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